# Assessment of Guide Reporting & Preliminary Results of Lion Monitoring

**Mara Predator Project**
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**Sara Blackburn**        maralions@gmail.com
**Laurence Frank**        lgfrank@berkeley.edu

**SUMMARY**
The Mara Predator Project is a long term effort to monitor lion populations north of the Masai Mara National Reserve with the participation of the tourism industry.  Lodge guides identify known lions during regular game drives and submit reports and identification photographs. Lodge visitors are also encouraged to participate by submitting sightings and photographs to a central, publicly accessible database.

This report shows that well-trained guides are able to accurately identify individual lions encountered on game drives and submit accurate reports.  One or two guides per lodge are enough to enumerate all lions in their game drive areas, and no new lions were reported after three months.  Thus, this system can be expanded to yield accurate data on lion numbers over large geographical areas where there is intensive tourism.

In the period between June and November 2010, 39 adult and subadult lions were identified on the Mara North and Lemek Conservancy areas.  As some lions are known to occur beyond the region covered by reporting guides, the actual number is likely to be around 45.  Double this number of lions have been positively identified in the same region over the last 28 months, suggesting that there is considerable movement into and out of the MNC-Lemek conservancies, and that wider geographical coverage of the region is likely to be highly informative, both as to total numbers and seasonal movements.

Given that lion numbers have plummeted in most other pastoralist areas, the partnership of local Masai landowners with the tourism industry is clearly a successful formula for conservation.

**Background**

Accurate data on wildlife numbers are the basis for all conservation measures, and continued monitoring is needed for assessing the efficacy of those measures. Because lions are the primary attraction for visitors to the Mara region and because there is concern about their numbers in the face of conflict with humans (a flawed 2005 study reported essentially no lions in community areas north of the MMNR), Living with Lions initiated a long term project in 2008, with the goal of monitoring the lion population by enlisting the participation of the tourism industry. By individually identifying all lions in regions regularly visited by tourists, a highly accurate count can be made. If this is maintained through tourist involvement via an attractive and engaging interface, long term detailed information on the Mara lion population will be a powerful tool for conservation and management, as well as an attraction for visitors.

Sara Blackburn has been monitoring lions in the Mara North and Lemek Conservancies since July 2008. Between June and September 2010, seven guides from four lodges were trained to identify lions. Here, we assess the ability of guides to accurately identify lions during routine game drives, and present preliminary data on the number of lions in the region.

Much time and effort has gone into the design and implementation of a novel and challenging method. Sara has emphasized a system that is both scientifically accurate and potentially beneficial to tourism partners and their guides.

*Guide Assessment*

We assessed the method of using lodge guides - who have no prior experience of scientific data collection - to accurately monitor the local lion population. Within each lodge, two guides were chosen as a main reporter and secondary reporter. After an initial training session and input from management, the most keen and able guide was chosen as a lead reporter (referred to here as the "A" Guide). The secondary guide ("B" Guide) also showed promise and ability, and was selected to ensure that reporting continued unbroken.

Training involved two days of classroom training (lion identification, reporting, photography, guest involvement and responsible viewing of lions) and a 3 to 5 hour practical in which guides identified lions in the field. Lion identification is a complex skill that requires refresher training, given to the guides through follow up sessions. This is dependent upon the individual guide, their ability and willingness to learn, and their availability for training.

In this assessment, one primary and one secondary guide (A and B levels) were compared for accuracy of reporting, lion identification and contribution to monitoring. Both guides encountered the same lions, traversed the same game drive areas and were given the same support from lodge management. However, the "B" guide received less training and follow up than the primary guide.

*Summary*

The A guide made more frequent and more accurate identifications, and compiled a higher number of useable reports. We found that focusing on a small number of guides per lodge was more effective than simply increasing the number of reporting guides, as better training allowed them to identify the less conspicuous lions. Supplying guides with cameras also increased success, allowing us to accurately identify lions in 88% of sightings made by "A" guides as opposed to 49% of sightings that relied upon guide judgement alone.

## 1a. Guide Accuracy

We assessed guide accuracy by comparing the percentage of correct identifications (IDs) made. Comparing guides based at the same lodge ensured that the same lions were encountered by each guide, ruling out differences in individual lions' 'ease' of identification. The influence of correct whisker spot identification training can be seen by comparing the "A" Guide, who has received thorough training, to the "B" Guide, with basic training. The "A" Guide was able to use the whisker spot pattern to reduce guesswork and rule out other similar lions.
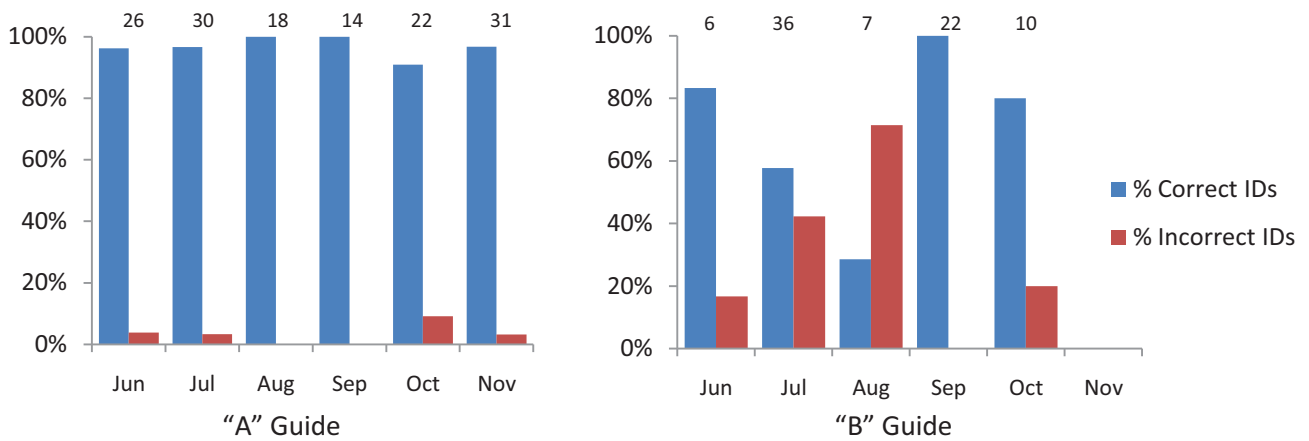


Fig. 1: Percentage of correct (blue) and incorrect (red) IDs attempts made by A Guide vs. B Guide. Note the consistently high success rate of the A Guide.

## 1b. Portion of Population Identifiable

Guide contribution to lion monitoring was assessed by comparing the proportions of individual lions correctly named and identified in the field by fully trained and partially trained guides. Trained guides were able to use the whisker spot pattern to correctly distinguish between individuals otherwise similar in appearance, for example, sub-adult females.

All individuals identified by B guides were also identified by A guides. Individual lodge contribution is therefore reliant not on the number of participating guides, but by simply ensuring that a small proportion of guides are fully trained.
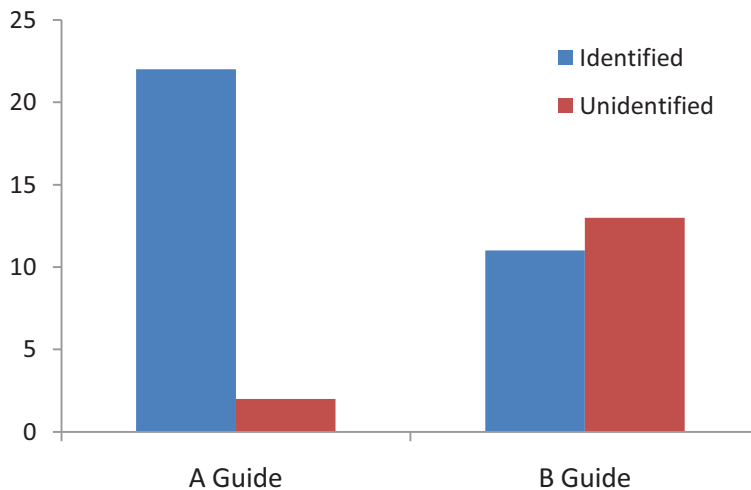


Fig. 2: Number of adult lions identified by guides with different levels of training out of a known local population of 24 individuals. Two subadult females for which we had no ID sheets were correctly labelled as unidentifiable by the A guide.

## c. Guide Improvement with Training

The importance of guide training and interest was assessed by examining the number of accurate reports compiled by "A" and "B" guides over time. An accurate report is defined as leading to the correct identification, number and location of a pride group at a given time. Accurate reports have been split to those initially made by guides themselves vs. those based on a photograph or researcher knowledge. Here, we focus on the initial method of identification, and guide IDs were always verified with photographs when possible.

Guide accuracy increased and the relative dependence on photos or researcher knowledge decreased with the "A" guide, who showed both the ability and willingness to improve knowledge and recognise a large number of individuals. The "B" guide was inconsistent and unable to improve over time. It was therefore always essential to check identification images, and when a photograph was not available, it was often not possible to confirm the identity of the lion or rely upon identifications made by the B Guide.
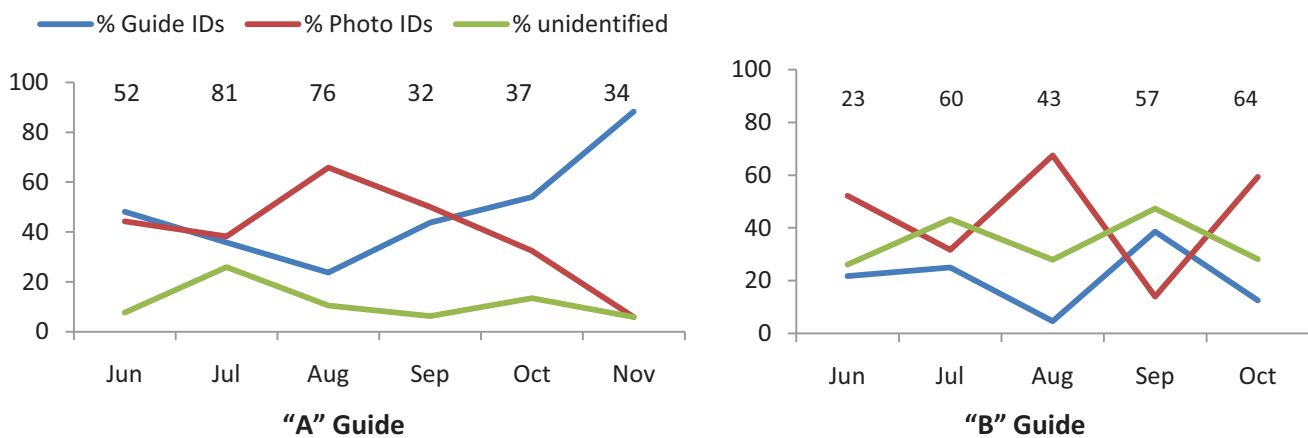


Fig. 3:     Percentage of guide reports leading to a correct identification achieved by guide IDs and photo IDs over time

## 2. Lion Numbers

**Minimum lion numbers were assessed by counting the number of identified individual adult and sub-adult lions present within the Mara North and Lemek Conservancies in the period June-November 2010. Adjacent conservancies (Olare Orok, Naibosho, Motorogi) are omitted in this assessment due to the relatively short period of monitoring on those areas.  The identified population in those areas will increase rapidly with continued monitoring, and a report will be distributed as soon as we have confidence in our numbers.**

**It is important to understand that these figures are based on identifiable individuals encountered using the lodge guides in monitoring. There is therefore bias towards individuals that are both easily observed and have been located within game-drive areas at any point since July 2008.**

Four lodges participated in guide training, two in each conservancy, starting at different times between June and September 2010 (Fig. 3).  To assess both the time required for guides to encounter all conspicuous individuals, and the number and distribution of lodges required to accurately cover the population, we graphed the total number of lions identified over time (Fig. 4). This assessment includes the participation of two lodges from each conservancy, which started at different times and are noted on the graph.
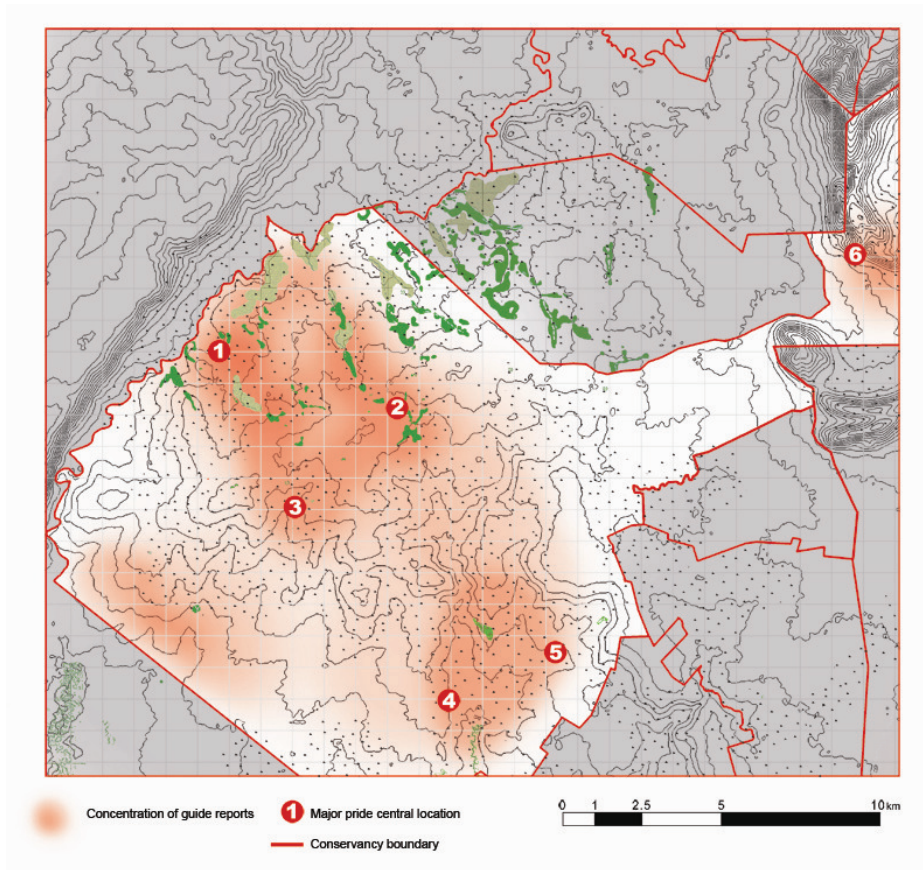
Fig. 5: Map showing the range and intensity of monitoring by guides within the Mara North Conservancy. Map also shows the key prides covered by monitoring efforts: **1. River Pride 2. Cheli & Peacock Pride; 3. Cheli Seven Pride; 4. Offbeat Pride; 5. Ngoyonai Pride and 6. Saruni Pride**
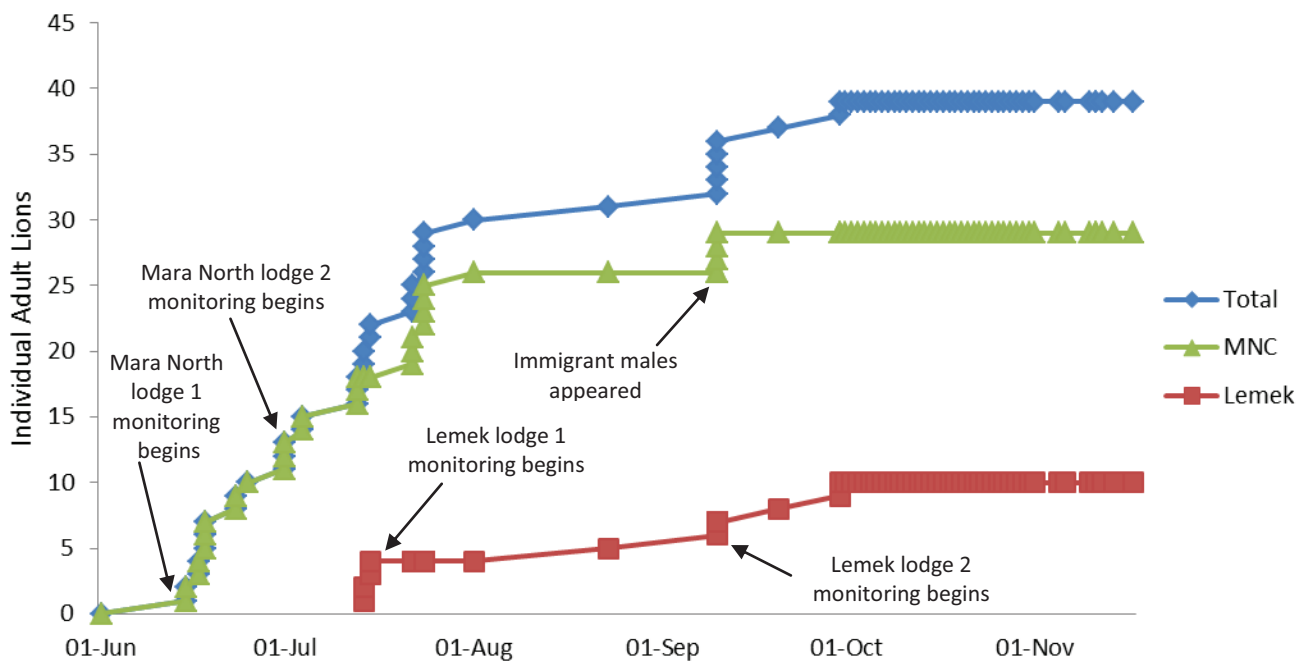


Fig. 5: Cumulative number of lions found by guides in each conservancy, June-November, 2010. Note that the addition of each lodge area increased the number of lions found. Levelling of the line suggests that most of the residents in an area have been identified: all resident lions in the MNC were encountered by August, until new males immigrated in September. NOTE: there may be other individuals in areas not driven by these lodges.

Excluding lions that moved into the area during the study, it took three months from the start of monitoring in both Mara North and Lemek Conservancies to encounter all lions resident in areas visited by lodge guides. Thus, monitoring intensity by lodge guides is sufficient to provide an absolute count of lion within game drive areas within three months.

The guides enumerated 10 adult and subadult lions in Lemek Conservancy and 29 in MNC. Obviously, this method will not count lions which never use tourism areas. Because guides drive areas known to support many visible lions it is likely that some lions are rarely encountered because they do not use these areas. However, lions move large distances, and most are likely to be encountered and identified by guides at least occasionally. Due to this uncertainty, there are probably at least 40 lions in the two conservancies, but most likely less than 50.

These numbers suggest a lion density of about 10/100 km$^2$, comparable to many prey-rich savannas in fully protected national parks. Given that lion numbers have plummeted in most other pastoralist areas, the partnership of local Masai landowners with the tourism industry is clearly a successful formula for conservation.

**Total Lions Identified 2008-2010**

Since Sara started in July 2008, a total of 90 adult and subadult lions have been positively identified in MNC-Lemek (Fig. 6); again, the levelling off of numbers despite increased effort suggests that most of the lions using the region have been documented. However, only about half of that number were enumerated in the period June-November 2010. The discrepancy between the two numbers is puzzling, as neither deaths nor dispersal of subadults are likely to account for the entire difference. The most likely explanation is that there is considerable movement of lions in the Mara region: as many as 100 lions may have used the MNC-Lemek region over the two year period, but less than half of that number are permanently resident. More detailed analysis of her sighting records will show part of the answer, but only use of GPS collars would reveal the full complexity of lion movements in the Mara.
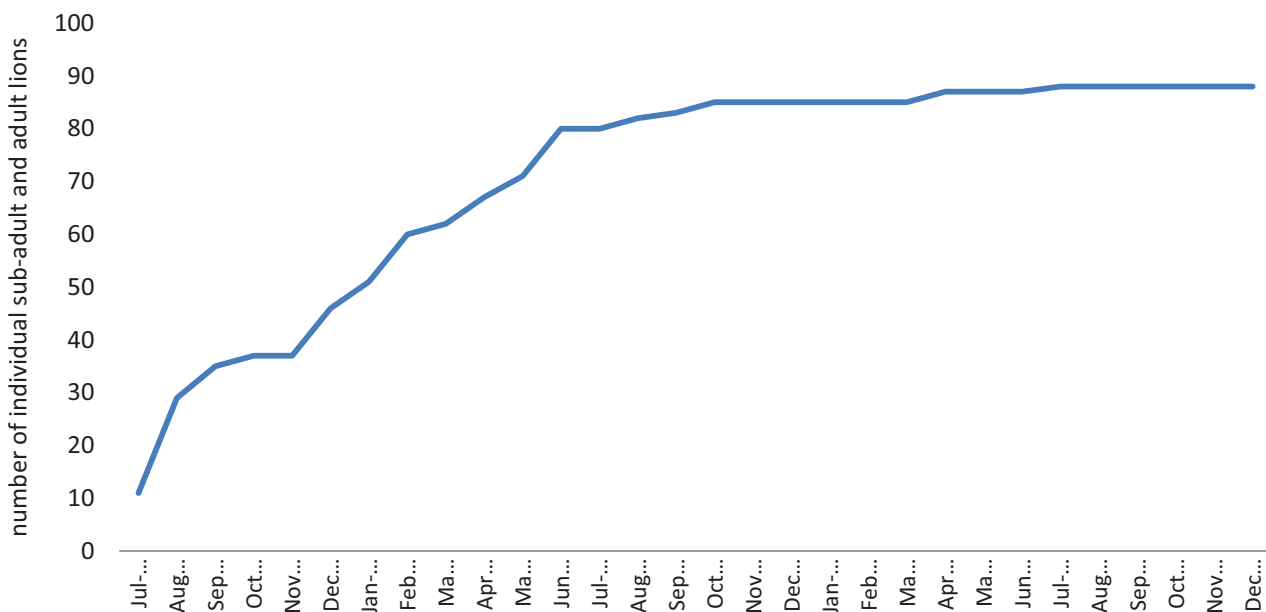


*Fig. 6:    Cumulative total of adult and subadult lions identified in MNC-Lemek between July 2008 and November 2010.*

*Conclusions*

With adequate training, interest and support from management, lodge guides are able to make a major contribution to knowledge of the regional lion population. Guides encounter and are able to accurately identify the majority of adult lions within their game drive areas within a few months.

Increasing the number of participating lodges increases the proportion of the population that can be monitored, but increasing the number of reporting guides per lodge does not have the same effect. Monitoring efficiency and accuracy is instead related to the amount of training given to each guide, plus their commitment, dedication and effort.

One limitation of this method is that it excludes areas that are not favourable for game drives, located far from a lodge, or with a large human population. However, one could also conclude that lion densities in such areas may be low, and guides focus game drives on areas of high wildlife density. Furthermore, fluctuating wildlife and livestock movements and a relatively high density of lions lead to pride ranges expected to cover at least some areas utilised for game drives. A study of significant duration would therefore encounter most individuals at some point.

Once no new lions are identified over a period of time, one may assume that all identifiable and approachable lions have been encountered within a given study area. As this point was reached within three months, we conclude that this is a reliable technique for monitoring lion numbers where good visibility and high tourism volume has habituated most individuals to vehicles.

Although over 90 lions were identified in the full 28 month period of study, only about half of that number were present between June and November 2010. We believe that this indicates considerable seasonal movement in the entire region, which more detailed analysis of existing records will help elucidate. Longer term study over a larger region will be required if we are to better understand lion use of the entire Mara region.

The density of about 10 lions per 100 km$^2$ indicates a robustly healthy population, a testament to the efficacy of conservation in the region.